CLAIMS

1. An air conditioning system (1) (101) (201) (401) (601) configured to treat the latent heat load and the sensible heat load in a room by performing a vapor compression refrigeration cycle operation, comprising:

a plurality of utilization side refrigerant circuits (10a, 10b) (210a, 210b) having an adsorbent heat exchanger (22, 23, 32, 33) (222, 223, 232, 233) provided with an adsorbent on the surface thereof, and capable of dehumidifying or humidifying air by alternating between an adsorption process in which moisture in air is adsorbed onto the adsorbent by causing the adsorbent heat exchanger to function as an evaporator that evaporates refrigerant and a regeneration process in which moisture is desorbed from the adsorbent by causing the adsorbent heat exchanger to function as a condenser that condenses the refrigerant;

a heat source side refrigerant circuit (10c) (210c) having a compression mechanism (61) (261) and a liquid container (62) (262) connected to an inlet side of the compression mechanism;

an exhaust gas connection pie (7, 207) connected to a discharge side of the compression mechanism and configured to connect the utilization side refrigerant circuits to the heat source side refrigerant circuit; and

an inlet gas connection pipe (8, 208) connected to the inlet side of the compression mechanism,

wherein

the air conditioning system can supply a room with air that passed through the adsorbent heat exchanger.

2. The air conditioning system (1) (101) (401) (601) according to claim 1, wherein

the heat source side refrigerant circuit (10c) (210c) comprises a supplementary condenser (66) (266) connected to the discharge side of the compression mechanism (61) (261).

3. The conditioning system (101) (401) (601) according to claim 1 or 2, comprising:

a plurality of second utilization side refrigerant circuits (310a, 310b) (510a, 510b) (710a, 710b) having air heat exchanger (322, 332) (522, 532) (722, 732) and capable of exchanging heat between refrigerant and air; and

a second heat source side refrigerant circuit (310c) (510c) (710c) connected to the second utilization side refrigerant circuits and including a second compression mechanism (361) (561) (761) and a heat source side heat exchanger (363) (563)

(763),

wherein

the air conditioning system can supply a room with air that passed through the air heat exchanger.

4. The air conditioning system (101) according to claim 3, wherein

the air conditioning system calculates a generated sensible heat treatment capacity value (Δt) that corresponds to the capacity of the sensible heat treatment that is performed along with the latent heat load treatment in a room in the first utilization side refrigerant circuits (210a, 210b) through an adsorption process or a regeneration process in the adsorbent heat exchanger (222, 223, 232, 233), and then controls the operational capacity of the second compression mechanism (361) in view of the generated sensible heat treatment capacity value.

5. The air conditioning system (101) according to claim 4, comprising a supply air temperature detection mechanism (227, 237) configured to detect the temperature of air to be supplied to a room after the air passed through the adsorbent heat exchanger (222, 223, 232, 233), wherein

the air conditioning system calculates the generated sensible heat treatment capacity value (Δt) based on the supply air temperature and the temperature of the room air detected by the supply air temperature detection mechanism.

6. The air conditioning system (101) according to claim 4 or 5, wherein

at system startup, air that passed through the air heat exchanger (322, 332) is supplied to a room, and outdoor air is prevented from passing through the adsorbent heat exchanger (222, 223, 232, 233).

7. The air conditioning system (101) according to claim 4 to 5, wherein

at system startup, in a state in which switching between the adsorption process and the regeneration process in the plurality of adsorbent heat exchangers (222, 223, 232, 233) is stopped, outdoor air is passed through one of the plurality of adsorbent heat exchangers and then is exhausted to the outside, and also room air is passed through another adsorbent heat exchanger among the plurality of adsorbent heat exchangers, besides the one through which the outdoor air passed, and then is supplied to a room again.

8. The air conditioning system (101) according to claim 4 or 5, wherein

at system startup, a switching time interval between the adsorption process and the regeneration process in the adsorbent heat exchanger (222, 223, 232, 233) is made

longer than that during normal operation.

9. The air conditioning system (101) according to any one of claims 6 to 8, wherein
the system startup operation is terminated after a predetermined period of time elapsed since system startup.

10. The air conditioning system (101) according to any one of claims 6 to 8, wherein
the system startup operation is terminated after a temperature difference between the target temperature of room air and the temperature of room air is equal to or below a predetermined temperature difference.

11. The air conditioning system (101) according to any one of claims 6 to 10, wherein
before the system startup operation starts, whether or not a temperature difference between the target temperature of room air and the temperature of room air is equal to or below a predetermined temperature difference is determined, and
when the temperature difference between the target temperature of room air and the temperature of room air is equal to or below a predetermined temperature, the system startup operation is prevented from being performed.

12. The air conditioning system (601) according to claim 3, comprising
a pressure control mechanism (742) (752) connected to a gas side of the air heat exchanger (722) (732) and configured to control the evaporation pressure of refrigerant in the air heat exchanger when the air heat exchanger is caused to function as an evaporator that evaporates refrigerant.

13. The air conditioning system (601) according to claim 12, wherein
the evaporation pressure of refrigerant is controlled by the pressure control mechanism (742) (752), based on the dew point temperature of room air, when the air heat exchanger (722) (732) is caused to function as an evaporator that evaporates refrigerant.

14. The air conditioning system (601) according to claim 13, comprising a pressure detection mechanism (743) (753) configured to detect the refrigerant pressure in the air heat exchanger (722) (732), wherein
the air conditioning system calculates a target evaporation pressure value (P3) based on the dew point temperature of room air and uses the pressure control mechanism to control the evaporation pressure of refrigerant, which was detected by the pressure detection mechanism, to be equal to or higher than the target evaporation pressure.

15. The air conditioning system (601) according to claim 14, comprising a condensation

detection mechanism (726) (736) configured to detect the presence of condensation in the air heat exchanger (722, 732), wherein

the air conditioning system changes the target evaporation pressure value (P3), when condensation is detected by the condensation detection mechanism.

16. The air conditioning system (401) (601) according to any one of claims 3 and 12 to 15, comprising a condensation detection mechanism (526, 536) (726, 736) configured to detect the presence of condensation in the air heat exchanger (522, 532) (722, 732), wherein

the air conditioning system stops the second compression mechanism (561) (761), when condensation is detected by the condensation detection mechanism.

17. The air conditioning system (401) (601) according any of claims 3 and 12 to 16, comprising a condensation detection mechanism (526, 536) (726, 736) configured to detect the presence of condensation in the air heat exchanger (522, 532) (722, 732), wherein

the second utilization side refrigerant circuit (510a, 510b) (710a, 710b) comprises an utilization side expansion valve (521, 531) (721, 731) connected to a liquid side of the air heat exchanger, and

the air conditioning system closes the utilization side expansion valve, when condensation is detected by the condensation detection mechanism.

18. The air conditioning system (401) (601) according to any one of claims 1 to 3 and 12 to 17, wherein

a switching time interval between the adsorption process and the regeneration process in the adsorbent heat exchanger (222, 223, 232, 233) can be changed.

19. The air conditioning system (401) (601) according to any one of claims 12 to 18, wherein

at system startup, treatment of the latent heat load in a room by the first utilization side refrigerant circuits (210a, 210b) is given priority over treatment of the sensible heat load in a room by the second utilization side refrigerant circuits (510a, 510b) (710a, 710b).

20. The air conditioning system (401) (601) according to claim 19, wherein

at system startup, treatment of the sensible heat load in a room by the second utilization side refrigerant circuits (510a, 510b) (710a, 710b) is stopped until the dew point temperature of room air is equal to or below the target dew point temperature.

21. The air conditioning system (401) (601) according to claim 19, wherein

at system startup, treatment of the sensible heat load in a room by the second

utilization side refrigerant circuits (510a, 510b) (710a, 710b) is stopped until the absolute humidity of room air is equal to or below the target absolute humidity.

22. The air conditioning system (401) (601) according to any one of claims 19 to 21, wherein

at system startup, outdoor air is passed through an adsorbent heat exchanger, whichever is performing the regeneration process, among the plurality of adsorbent heat exchangers (222, 223, 232, 233), and then is exhausted to the outside, and also, room air is passed through an adsorbent heat exchanger, whichever is performing the adsorption process, among the plurality of adsorbent heat exchangers, and then is again supplied to a room.

23. The air conditioning system (401) (601) according to any one of claims 19 to 22, wherein

before starting the system startup operation, whether or not a dew point temperature difference between the target dew point temperature of room air and the dew point temperature of the room air is equal to or below a predetermined dew point temperature difference is determined, and

when the dew point temperature difference between the target dew point temperature of room air and the dew point temperature of room air is equal to or below a predetermined dew point temperature difference, the startup operation is prevented from being performed.

24. The air conditioning system (401) (601) according to any one of claims 19 to 22, wherein

before starting the system startup operation, whether or not an absolute humidity difference between the target absolute humidity of room air and the absolute humidity of the room air is equal to or below a predetermined absolute humidity difference, and

when the absolute humidity difference between the target absolute humidity of room air and the absolute humidity of room air is equal to or below a predetermined absolute humidity difference, the system startup operation is prevented from being performed.